

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
19 October 2000 (19.10.2000)

PCT

(10) International Publication Number  
**WO 00/62502 A3**

(51) International Patent Classification<sup>7</sup>: **H04L 29/06**

(21) International Application Number: **PCT/US00/09861**

(22) International Filing Date: **12 April 2000 (12.04.2000)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
60/128,872 12 April 1999 (12.04.1999) US  
09/437,637 10 November 1999 (10.11.1999) US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:

US 09/437,637 (CIP)  
Filed on 10 November 1999 (10.11.1999)  
US 60/128,872 (CIP)  
Filed on 12 April 1999 (12.04.1999)

(71) Applicant (for all designated States except US): **RAIN-FINITY, INC.** [US/US]; Suite 200, 87 N. Raymond Avenue, Pasadena, CA 91103 (US).

(72) Inventors; and

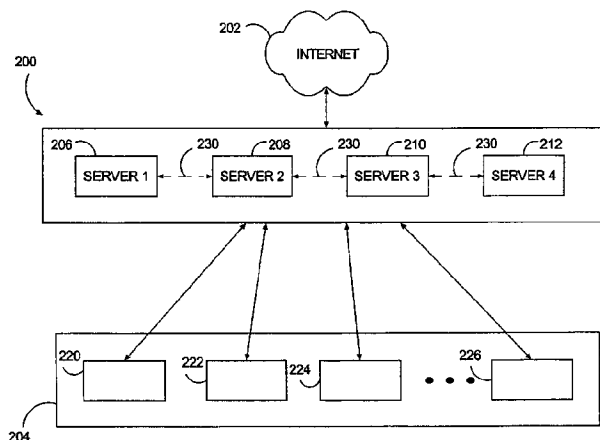
(75) Inventors/Applicants (for US only): **BRUCK, Jehoshua** [US/US]; 5657 Bramblewood Road, La Canada, CA 91011 (US). **BOHOSSIAN, Vasken** [CA/US]; 1127 E. Del Mar Boulevard #227, Pasadena, CA 91106 (US). **FAN, Chenggong** [CN/US]; 1155 E. Del Mar Boulevard #105, Pasadena, CA 91106 (US). **LEMAHIEU, Paul** [US/US]; 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106 (US). **LOVE, Philip** [GB/US]; 1032 E. Del Mar Boulevard #301, Pasadena, CA 91106 (US).

(74) Agents: **HALL, David, A.** et al.; Heller Ehrman White & McAuliffe LLP, Suite 700, 4250 Executive Square, La Jolla, CA 92037 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

[Continued on next page]

(54) Title: **DISTRIBUTED SERVER CLUSTER FOR CONTROLLING NETWORK TRAFFIC**



(57) Abstract: A scalable, distributed, highly available, load balancing server system having multiple machines is provided that functions as a front server layer between a network (such as the Internet) and a back-end server layer having multiple machines functioning as Web file servers, FTP servers, or other application servers. The front layer machines comprise a server cluster that performs fail-over and dynamic load balancing for both server layers. The operation of the servers on both layers is monitored, and when a server failure at either layer is detected, the system automatically shifts network traffic from the failed machine to one or more operational machines, reconfiguring front-layer servers as needed without interrupting operation of the server system. The server system automatically accommodates additional machines in the server cluster, without service interruption. The system operates with a dynamic reconfiguration protocol that permits reassignment of network addresses to the front layer machines. The front layer machines perform their operations without breaking network communications between clients and servers, and without rebooting of computers.



(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(88) **Date of publication of the international search report:**  
29 March 2001

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *With international search report.*

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/09861

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 26559 A (GTE INTERNETWORKING INC) 18 June 1998 (1998-06-18) page 13, line 29 -page 21, line 23 figures 2B,3C,4C	1,2
A	---	3,18,30
A	US 5 341 477 A (MORENCY JOHN P ET AL) 23 August 1994 (1994-08-23) figures 2,2A,7 column 4, line 38 - line 68 column 11, line 15 - line 50 ---	1-3,18, 30
A	US 5 774 668 A (CHOQUIER PHILIPPE ET AL) 30 June 1998 (1998-06-30) figures 1,5A,5B column 4, line 54 -column 8, line 63 column 12, line 5 -column 13, line 38 --- -/--	1-3,18, 30

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

26 September 2000

Date of mailing of the international search report

06/10/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Eraso Helguera, J

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/09861

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 774 660 A (LIU ZAIDE ET AL) 30 June 1998 (1998-06-30) figure 19 column 18, line 43 -column 19, line 45 ----	1-30
A	GOLDSZMIDT G S: "LOAD MANAGEMENT FOR SCALING UP INTERNET SERVICES" IEEE NETWORK OPERATIONS AND MANAGEMENT SYMPOSIUM, US, NEW YORK, NY: IEEE, vol. CONF. 10, 15 February 1998 (1998-02-15), pages 828-835, XP000793430 ISBN: 0-7803-4352-2 the whole document ----	1-30
P, X	WO 99 33227 A (HOLONTECH CORP) 1 July 1999 (1999-07-01) page 11, paragraph 2 -page 12, paragraph 3 page 16, paragraph 2 -page 18, paragraph 2 figure 2 ----	1
P, X	US 5 898 830 A (COLEY CHRISTOPHER D ET AL) 27 April 1999 (1999-04-27) figures 4, 9 column 8, line 25 -column 9, line 51 column 12, line 29 -column 13, line 53 -----	1, 2

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/09861

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
W0 9826559	A	18-06-1998	AU 5692498 A EP 1016253 A	03-07-1998 05-07-2000
US 5341477	A	23-08-1994	AT 151183 T AU 611605 B AU 4996190 A AU 630291 B AU 7603391 A CA 2010762 A DE 69030340 D DE 69030340 T EP 0384339 A JP 3116262 A	15-04-1997 13-06-1991 13-09-1990 22-10-1992 15-08-1991 24-08-1990 07-05-1997 20-11-1997 29-08-1990 17-05-1991
US 5774668	A	30-06-1998	US 5951694 A	14-09-1999
US 5774660	A	30-06-1998	NONE	
W0 9933227	A	01-07-1999	AU 1803099 A	12-07-1999
US 5898830	A	27-04-1999	US 6052788 A	18-04-2000